

I Claim:

1. An imaging apparatus, comprising:
an electromagnetic pulse source;
a beam splitter splitting a pulse from the electromagnetic pulse source into a
5 first portion and a second portion;
an X-ray source generating a beam in response to the first pulse portion, the
beam directed toward an object for generating an object image; and
a time gate capturing the object image in response to the second pulse
portion.
- 10 2. The apparatus of claim 1 wherein the electromagnetic pulse source
comprises a laser.
3. The apparatus of claim 3 wherein the laser produces a pulse having a
15 width of about 10 – 30 femtoseconds and an energy of at least 125 – 250 mJ at a rate
of about 100 – 250 pulses per second.
4. The apparatus of claim 1 wherein the X-ray source comprises a laser-
produced-plasma X-ray source.
- 20 5. The apparatus of claim 1 wherein the X-ray source comprises a
molybdenum target.
6. The apparatus of claim 1 wherein the time gate comprises a
25 microchannel plate detector.
7. The apparatus of claim 1 including an adjustable delay through which
the second pulse portion travels to reach the time gate.
- 30 8. The apparatus of claim 1 wherein the time gate comprises a Raman
amplifier and the apparatus includes:

a Raman generator receiving the X-ray beam from the X-ray source and generating in response an imaging beam directed toward the object for generating an object image; and

a beam combiner combining the second pulse portion with the object image
5 into a combined beam directed to the Raman amplifier, the amplifier responsive to the second pulse portion to capture the object image.

9. The apparatus of claim 8 including an adjustable delay through which the second pulse portion travels to reach the beam combiner.

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10. A method for producing an image of an object, comprising:
generating an electromagnetic pulse;
splitting the pulse into a first portion and a second portion;
generating an X-ray beam in response to the first pulse portion, the beam
15 directed toward an object for generating an object image; and
capturing the object image in response to the second pulse portion.

11. The method of claim 10 wherein generating an X-ray beam in response to the first pulse portion includes applying the first pulse portion to an X-ray source that in response generates the X-ray beam.
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12. The method of claim 10 wherein capturing the object image in response to the second pulse portion includes applying the second pulse portion to a time gate that in response captures the object image.
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13. The method of claim 10 wherein the object image is captured by a time gate, the method including combining the object image and the second pulse portion prior to arrival at the time gate.

14. The method of claim 10 including generating an imaging beam with a Raman generator in response to the X-ray beam, the imaging beam directed toward an object for generating an object image
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15. The method of claim 10 wherein the object for which an image is generated is human tissue.

5 16. The method of claim 10 including, after capturing a first object image:

administering a contrast agent to the object;
capturing a second object image; and
comparing the first and second captured object images.

10 17. The method of claim 16 wherein the comparing includes subtracting or dividing the pixels of one object image from the pixels of the other object image.

15 18. An imaging apparatus, comprising:
an electromagnetic pulse source;
a beam splitter splitting a pulse from the electromagnetic pulse source into a first portion and a second portion, the first pulse portion directed toward an object for generating an object image; and
a microchannel plate detector capturing the object image in response to the
20 second pulse portion.

19. The apparatus of claim 18 wherein the electromagnetic pulse source comprises a laser.

25 20. The imaging apparatus of claim 19 including a second electromagnetic pulse source between the beam splitter and the object, the second pulse source generating in response to the first pulse portion an imaging beam directed toward the object for generating an object image.

30 21. The apparatus of claim 20 wherein the second electromagnetic pulse source is a Raman generator.

22. The apparatus of claim 18 including an adjustable delay through which the second pulse portion travels to reach the microchannel plate detector.

23. A method of producing an image, comprising:
5 generating an electromagnetic pulse;
splitting the pulse into a first portion and a second portion;
generating an imaging beam in response to the first pulse portion, the imaging beam directed toward an object for generating an object image; and
capturing the object image at a microchannel plate detector in response to the
10 second pulse portion.

24. The method of claim 23 wherein generating an image beam in response to the first pulse portion includes applying the first pulse portion to an X-ray source.
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25. The method of claim 23 wherein capturing the object image in response to the second pulse portion includes applying the second pulse portion to the microchannel plate detector that in response captures an instance of the object image incident on the detector.
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26. The method of claim 23 including combining the object image and the second pulse portion prior to arrival at the microchannel plate detector.